E.S. 1.0 EXECUTIVE SUMMARY

E.S. 1.1 Introduction

The City of Portland (City) has submitted an application to the National Marine Fisheries Service (NMFS) for an Incidental Take Permit (ITP) in accordance with section 10(a)(1)(B) of the Federal Endangered Species Act (ESA), as amended. The City is seeking this authorization so that activities associated with implementing the *Bull Run Water Supply Habitat Conservation Plan* (Bull Run HCP or Proposed Action) comply with the ESA, while providing protection for four[1] species listed under the ESA (the proposed covered species). The covered species and their status appear in Table ES-1.

Table ES-1 Proposed covered species in the Bull Run HCP

Common Name	Scientific Name	Status[1]
Fish		
Lower Columbia River Chinook Salmon (Spring and Fall)	*Oncorhynchus tshawytscha*	T
Lower Columbia River Steelhead	*Oncorhynchus mykiss*	T
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	T
Columbia River Chum Salmon	*Oncorhynchus keta*	T

[1] Status Codes: T = Threatened

In addition to the four proposed covered species, the Bull Run HCP includes conservation measures and effects analyses for 18 fish and wildlife species that are not proposed for ITP coverage. Some of these species – for example, fish and amphibians – would benefit from the same measures that benefit the proposed covered species. Other species, including birds and mammals, do not depend on aquatic habitat, but occur in the Bull Run Watershed and could be affected by City activities. The addressed species and their status appear in Table ES-2.

Because the proposed issuance of an ITP would be a Federal action that may affect the human environment, this issuance is subject to review under the National Environmental Policy Act (NEPA). NEPA provides an interdisciplinary framework for Federal agencies to evaluate environmental consequences of programs and projects over which they have discretionary authority. The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) is

[1] The Bull Run HCP states that there are five covered species, differentiating between fall and spring run Chinook salmon. However, this EIS states that there are four covered species because fall and spring run Chinook salmon are the same species.

Table ES-2 Other species addressed in the Bull Run HCP

Common Name	Scientific Name	Status[1]
Fish		
Coastal Cutthroat Trout	*Oncorhynchus clarki clarki*	SOC
Rainbow Trout	*Oncorhynchus mykiss*	None
Pacific Lamprey	*Lampetra tridentata*	SOC
River Lamprey	*Lampetra ayresi*	SOC
Western Brook Lamprey	*Lampetra richardsoni*	None
Amphibians and Reptiles		
Cope's Giant Salamander	*Dicamptodon copei*	None
Cascade Torrent Salamander	*Rhyacotriton cascadae*	None
Clouded Salamander	*Aneides ferreus*	None
Oregon Slender Salamander	*Batrachoseps wrighti*	SOC
Coastal Tailed Frog	*Asacaphus truei*	SOC
Northern Red-legged Frog	*Rana aurora aurora*	SOC
Cascades Frog	*Rana cascadae*	SOC
Western Toad	*Bufo boreas*	None
Western Painted Turtle	*Chrysemys picta belli*	None
Northwestern Pond Turtle	*Clemmys marmorata marmorata*	SOC
Birds and Mammals		
Bald Eagle	*Haliaeetus leucocephalus*	None
Northern Spotted Owl	*Strix occidentalis caurina*	T
Fisher	*Martes pennanti*	C

[1]Status Codes: T = Threatened; C = Candidate; SOC = Species of Concern

the Lead Agency under NEPA for issuance of the incidental take permit (ITP) described below. The U.S. Forest Service (USFS, specifically the Mt. Hood National Forest) is a cooperating agency. This EIS evaluates the impacts of issuing an ITP and implementing the *Bull Run Water Supply Habitat Conservation Plan* (Bull Run HCP or Proposed Action).

The Bull Run HCP was prepared in support of the City's application for an ITP to cover the continued operation and maintenance of the Bull Run water supply system. The City prepared the Bull Run HCP in response to Federal listings of fish species as threatened under the ESA and to the Oregon Department of Environmental Quality (ODEQ) designation of portions of the Sandy River and lower Bull Run River as "water quality limited" due to temperature impacts.

The City requests coverage for the incidental take of listed covered species for a term of 50 years. The HCP would provide measures to minimize and mitigate impacts of the proposed incidental taking of listed covered species and the habitats upon which they depend. The City is proposing specific activities or projects for which take authorization would be provided; these are described in more detail in Subsection 2.2.2.2, Covered Activities. The three categories of covered activities are Operation, Maintenance, and Repair of the Water System; Habitat Conservation, Research, and Monitoring Measures; and Incidental Land Management Activities.

E.S. 1.2 Purpose and Need

The purpose of the Proposed Action is to enable the City to continue operating the Bull Run water supply system on a long term basis while complying with the ESA. If granted, the proposed ITP would authorize the incidental take of four covered species.

The need for the proposed action is to provide broader protection and conservation for listed, proposed, and unlisted species, than is available under section 9 of the ESA while managing the Bull Run water supply system on a long term basis. The City's needs and goals are to (1) provide cost effective minimization and mitigation measures for incidental take, (2) ensure an adequate long term water supply at reasonable cost to ratepayers, and (3) comply with state water quality standards and total maximum daily load (TMDL) designations for the Bull Run River and Sandy River Basin. NMFS needs and goals are to conserve listed species and their habitats and associated species during the City's proposed activities to ensure compliance with the ESA and other applicable laws and regulations.

E.S. 1.3 Alternatives

This EIS analyzes a No-action Alternative, the Proposed Action Alternative, and a Fish Passage Alternative. The alternatives are identified as Alternatives 1, 2, and 3 respectively. A brief summary of each alternative is provided below. Section 2.0, Proposed Action and Alternatives, provides detailed descriptions of the three alternatives.

E.S. 1.3.1 No-action Alternative

Under the No-action Alternative, the City would not implement its proposed Bull Run HCP and NMFS would not issue an ITP; however, the City would comply with the TMDL. No other measures included in the Proposed Action would be implemented. None of the monitoring, research, or adaptive management programs that would occur under the Proposed Action are included in the No-action Alternative. The City would operate the Bull Run water supply system as described below.

Flow management under the No-action Alternative is to facilitate implementation of the temperature standards. This means for the 50-year study period, flows from June 15 to September 30 would range from 20 to 40 cubic feet per second (cfs) depending on weather conditions (average 35 cfs). A minimum flow of 30 or 70 cfs would be met from October 1 through October 31 depending on the type of water year (normal versus critical).

The City has been implementing flow measures downstream of Bull Run Dam 2 on an experimental basis in order to help determine the costs and operational changes that would be required if the Bull Run HCP were approved. Flow management under the No-action Alternative would differ from the flows currently being maintained for the lower Bull Run River. In the absence of an approved HCP (i.e., under the No-action Alternative), the City would not have a reason to continue its current experimental operations. Flow measures to manage downstream water temperature (July 1 – October 31) would remain the same as current conditions (i.e., consistent with proposed HCP measures F-1 and F-2). Other flow commitments for November through May – spring and fall flow measures to optimize habitat conditions, critical year flow measures, and downramping measures – would not be continued under the No-action Alternative.

The City's strategy for managing temperature relies on using the available cold water in the reservoirs to control temperatures in the lower river and in the water distribution system. The City stores cold water in the reservoirs in early summer when overall temperatures are lower, and releases it in the late summer when river temperatures are warmer.

Under the No-action Alternative, the City would manage temperature to maintain a 7-day moving average of the maximum daily water temperature of the lower Bull Run River below 69.8°F (21°C) for salmon/trout rearing. This is the same as Measure T-1 (pre-infrastructure temperature management) under the Proposed Action. The City chose a 69.8°F (21°C) maximum target because it allows for continued salmonid growth (Sullivan et al. 2000) and because the City cannot meet a lower maximum

temperature with the current water supply infrastructure. In 2005 and 2006, the City did not exceed a maximum water temperature target of 69.8°F (21°C) for the lower Bull Run River.

Federal water quality standards for the lower Bull Run River designate the river as core cold water habitat. The lower Bull Run River, however, currently does not meet cold water temperature standards, and it is included on the State of Oregon's list of impaired waters (ODEQ 2005). ODEQ developed a TMDL and Water Quality Management Plan for the Sandy River Basin, including the lower Bull Run River. The TMDL established numeric temperature and natural condition temperature criteria for the lower Bull Run River.

Full compliance with the TMDL however, would not be possible without modification to the existing infrastructure. Under the No-action Alternative, the City would modify the Dam 2 intake towers for selective withdrawal of cold water and modify the Dam 2 stilling pool and its rock weir. Both of these changes would allow more effective use of cold water stored in the reservoirs and would enable the City to meet TMDL requirements. Temperature management after the modifications are in place would be the same as described in Measure T-2 (post-infrastructure temperature management) under the Proposed Action.

E.S. 1.3.2 Proposed Action

Under Alternative 2, the Proposed Action, NMFS would issue an ITP and the City would implement the Bull Run HCP. This would result in the implementation of conservation measures to ensure the protection of covered species and their habitat. Compensation, avoidance, and minimization measures for impacts to covered species and their habitats would be provided in compliance with the goals, objectives, and conservation strategies described in the Bull Run HCP. As with the No-action Alternative, implementation of the Proposed Action is expected to achieve compliance with the TMDL. Most of the other conservation measures, however, are unique to the Proposed Action.

The City is requesting incidental take authorization for specific covered activities associated with operation, maintenance, and repair of the water system; implementation of HCP conservation and monitoring measures; and incidental land management activities. Covered activities are discussed in detail in Subsection 2.2.2.2, Covered Activities.

The City developed a program of proposed habitat conservation measures. Because the City's water supply system is located on the Bull Run River, the conservation measures focus on addressing the impacts of continued operations on the river. However, some impacts could not feasibly be avoided. Consequently, the City also included conservation measures to improve conditions for the four covered

species and other species in the greater Sandy River Basin. These are considered offsite conservation measures. The Proposed Action also includes a habitat fund and a monitoring, research, and adaptive management program.

E.S. 1.3.2.1 Lower Bull Run River Habitat Conservation Measures

Conservation measures in the lower Bull Run River include instream flow measures, water temperature measures, instream and riparian habitat measures, and operations and maintenance measures. The flow measures include a normal water year regime (measure F-1) and a critical water year regime (measure F-2) to regulate the amount and timing of flow releases from Bull Run Dam 2. Measure F-1 includes guaranteed minimum flows and other criteria to maintain flow levels for spawning, rearing, and migrating salmonids and other aquatic species. Measure F-2 also includes guaranteed minimum flows, but they are for critical water year regimes. These measures provide for minimum flows in the summer and early fall in the same manner as the No-action Alternative to improve temperature conditions, but also include additional flow requirements during the remainder of the year to improve other habitat values.

In addition to the flow management measures, the City developed a measure to protect against large decreases in the river level that could trap small salmonids (measure F-3). The City is also proposing to maintain natural instream flows in the Little Sandy River (measure F-4). Because the Little Sandy is a tributary to the Bull Run River, Little Sandy flows would contribute to increasing lower Bull Run River flows.

The City plans for design and construction of the intake tower modifications (discussed under the No-action Alternative) to be completed within the first 5 years of the Bull Run HCP (measure T-2). Until the modifications are in place, the City would implement measure T-1 to manage temperature. After the modifications are in place, the City would manage flow in accordance with measure T-2 to fully comply with the TMDL requirements.

The City is proposing conservation measures for gravel augmentation (measure H-1), fish passage at Walker Creek (measure P-1), and riparian forest protection (measure H-2) in or along the lower Bull Run River. The City also developed three habitat conservation measures to improve habitat conditions in Bull Run Reservoir 2. Measure R-1 follows specific operating criteria to avoid or minimize mortality of cutthroat and rainbow trout. Measure R-2 includes removing cutthroat trout from the Dam 2 spillway approach canal to prevent mortality due to temperature. Measure R-3 includes removing reed canarygrass from three areas along the north bank of the upper end of Bull Run Reservoir 1 to improve

habitat for amphibians. The City also is proposing three terrestrial conservation measures to minimize impacts to spotted owls, bald eagles, and fishers.

The City would implement two measures to address potential impacts associated with operation and maintenance (O&M) of the water supply system. Under conservation measure O&M-1, the City would prevent paint and debris from falling in the river during bridge and conduit maintenance at all active stream crossings; avoid or minimize erosion during repair and maintenance of all water supply infrastructure; and dechlorinate water drained from conduits before it is discharged to a waterway. Under Measure O&M-1, the City also would not use insecticides on covered lands, and would only allow very limited herbicide use on transmission line easements in the Bull Run and for necessary control of invasive plants subject to preapproval by NMFS and, if the herbicide use was occurring on National Forest lands, coordination with the USFS. Under Measure O&M-2, the City would implement a series of measures to avoid or minimize spill effects at the Headworks facility below Bull Run Dam 2 and at the Sandy River Station, a 5.5 acre maintenance facility located next to the mainstem Sandy River.

E.S. 1.3.2.2 Sandy River Basin Habitat Conservation Measures

The City is proposing 31 offsite conservation measures to improve fish habitat in the greater Sandy River Basin, as described in Section 7.5 of the Bull Run HCP. The measures include placement of large wood to create habitat; purchase of approximately 425 acres of riparian easements in the lower Sandy River Watershed, the middle Sandy River Watershed, the upper Sandy River Watershed, the Salmon River Watershed, and in the Zigzag River Watershed; reconnection of the original river mouth and of isolated side-channel habitat in the Sandy River Delta; fish passage for 5.5 miles of Alder Creek and 12 miles of Cedar Creek; water right acquisition in Cedar Creek; channel restoration in the Salmon and Zigzag River Watersheds; and a small amount of carcass supplementation. Section 7.5 of the Bull Run HCP provides more information on the offsite habitat conservation measures. The City also is proposing three conservation measures to minimize impacts to spotted owls, bald eagles, and fishers.

E.S. 1.3.2.3 Habitat Fund

The Proposed Action includes a habitat fund, using a portion of the Bull Run HCP funding, to contribute to projects implemented in coordination with the Sandy River Basin Partners, thereby contributing to large scale restoration in the Sandy River Basin. The Habitat Fund would total $9 million. Of this amount, the City would make $5 million available in four increments prior to year

20 of the HCP and dedicate the remaining $4 million to adaptive management. If the $4 million is not needed for adaptive management, it would be used for additional partnership projects.

E.S. 1.3.2.4 Monitoring, Research, and Adaptive Management Programs

The City has identified measurable habitat objectives for each conservation measure. Compliance would be monitored and documented for all the conservation measures (Section 9.2.1 of the Bull Run HCP). In addition, effectiveness monitoring would be undertaken for those measures that present some degree of uncertainty about their biological effectiveness, such as gravel placement and instream habitat enhancement (Section 9.2.2 of the Bull Run HCP).

The City would implement four research components in the Bull Run Watershed and one research component in the greater Sandy River Basin. In the Bull Run River, the City would study placement of spawning gravel, degree of Chinook spawning gravel scour, concentrations of total dissolved gases, and abundance of spawning Chinook adults. In the Sandy River Basin, the City would collaborate with the Oregon Department of Fish and Wildlife (ODFW), Mt. Hood National Forest, Bureau of Land Management (BLM), and ODEQ to measure the number of juvenile salmonid outmigrants. Section 9.3 of the Bull Run HCP provides more detailed information about the research components.

The proposed Bull Run HCP includes provisions to select, fund, and implement additional conservation measures if the prescribed conservation measures do not achieve the results necessary to maintain compliance with ESA section 10 requirements. This adaptive management program is described in detail in Section 9.4 of the Bull Run HCP.

E.S. 1.3.2.5 Changed Circumstances

The proposed Bull Run HCP contains provisions for changed circumstances – conditions that substantially change during the term of the HCP that might warrant changes in the conservation strategy.

- Long-term changes in the hydrology of the Bull Run River could occur as a result of global climate change. The City will study reservoir inflow data in 2025 (and every 5 years thereafter) and employ statistical analyses to determine if significant changes have occurred. If significant changes are documented, the City would participate in good-faith discussions with NMFS to review the HCP flow measures. The objective of the discussions would be to continue meeting the terms of the HCP under a new hydrologic regime, if feasible.

- Similar to the above, long-term changes in climatic conditions could affect the City's ability to meet temperature standards. If that occurs, the City will enter into good-faith discussions with NMFS and the ODEQ to review the HCP flow and temperature measures. Possible outcomes could include changes to the flow and temperature measures.

- A significant decrease in the quantity or quality of fish habitat within the Sandy River Basin could alter the overall status of one or more covered species, as well as the relative impact of incidental take associated with the water supply system. In the event of such a change, the City and NMFS would enter into good-faith discussions to explore available response options such as additional habitat restoration actions.

- NMFS might list additional species as threatened or endangered under the ESA, delist species that are currently listed, or declare a listed species extinct. If one of these changed circumstances occurs, the City would take various response actions leading to the addition of species and conservation measures to the HCP, or deletion of species and conservation measures from the HCP. The City and NMFS would enter into good-faith discussions to develop the appropriate response actions.

E.S. 1.3.3 Fish Passage Alternative

Under Alternative 3, the City would provide upstream and downstream fish passage facilities at Bull Run Dam 1 and Bull Run Dam 2. The characteristics of these facilities are summarized below and described in more detail in Appendix B, Bull Run Fish Passage Alternative Technical Memorandum. This alternative also includes the lower Bull Run River conservation measures for temperature (Measures T-1 and T-2) and flow (Measures F-1 through F-3); the terrestrial wildlife conservation measures (W-1, W-2, W-3); and the Bull Run habitat measures (O&M-1 and O&M-2; R-1 through R-3; P-1; F-4; and H-1 and H-2) to address potential impacts associated with operation and maintenance of the water supply system. Because the offsite conservation measures under the Proposed Action are designed in part to compensate for blocking access to habitat upstream of Bull Run Dam 2, those measures are not included under the Fish Passage Alternative.

The City would install the first upstream fish passage facility, the Rock Weir Fish Collection and Transportation Facility, at the rock weir located below the spillway stilling basin of Dam 2. It would include a fishway and trap located at the existing 15-foot-high rock weir structure. Fish would enter the fishway, ascend to the trap, be crowded into a hopper, and then be placed into a truck for transportation

past Dam 2. The water supply necessary to operate the facility would flow by gravity from the stilling basin.

The City would install the second upstream fish passage facility, Bull Run Dam 1 Fish Collection and Transportation Facility, on the right bank of the river immediately downstream of the powerhouse tailrace. It would operate similar to the proposed Rock Weir Facility described above. An estimated 10 pools would be required to enable migrating adults to ascend high enough to be trapped above the flood stage. A gravity water supply is not available to run this facility, so all of the necessary water would be pumped from the tailrace. A tailrace barrier may be required to prevent fish from being falsely attracted to the powerhouse tailrace or outlet works on the left bank.

The City would install downstream fish passage facilities in Bull Run Reservoir 1. The facility would include a floating surface collector with guide nets mounted on a floating barge in the reservoir, using low head pumps to create attraction flows. The fish would then be routed into a pipe to a fish transfer facility moored to the face of the dam. A crane on the deck of the dam would be used to load fish into trucks, and collected fish would be placed back into the river downstream of Bull Run Dam 2. The City also would install a downstream fish passage facility at Dam 2. This facility would be similar to the Dam 1 facility described above.

E.S. 1.4 Potential Effects of Alternatives

The potential environmental effects associated with the Proposed Action and Alternatives are summarized in Table ES-3 and are described in detail in Section 4.0, Environmental Consequences.

Table ES-3 Summary of potential impacts for each alternative

Category	No-action	Proposed Action	Fish Passage
Land Use	Activities associated with the No-action Alternative would be consistent with applicable land use plans and policies.	Activities associated with the Proposed Action would be consistent with applicable land use plans and policies.	Activities associated with the Fish Passage Alternative would be consistent with applicable land use plans and policies.
Vegetation	The No-action Alternative is expected to result in no changes to vegetative habitat conditions. However, there would be less certainty of protection than under the Proposed Action.	Three special-status plant species have the potential to occur in the action area. Habitat areas for two of these species (white rock larkspur and peacock larkspur) are not expected to be affected by implementation of the Proposed Action because covered activities would not occur in them. Habitat for the third species, tall bugbane, may occur within riparian communities, and therefore it may be temporarily disturbed by management activities on the riparian easements. Overall, management activities in riparian easements would benefit this species by improving long term habitat conditions.	Construction of the fish passage facilities would occur mostly in water or in near-shore areas with limited vegetative cover. Moreover, because none of the riparian habitat conservation measures are included in this alternative, the impacts to vegetative communities – and the three special-status plant species – would be the same as those described for the No-action Alternative.

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
Birds and Mammals	Water supply operations and related activities that would continue under No-action are not expected to cause a change in existing bird and mammal habitat conditions. However, there would be less certainty of protection than under the Proposed Action.	Potential impacts resulting from water supply operations and related activities are the same as those described for the No-action Alternative. These impacts would be minimized by HCP conservation measures W-1 (Minimize Impacts to Spotted Owls) and W-2 (Minimize Impacts to Bald Eagles). The implementation of riparian conservation measures could cause disturbance, but such disturbance would be localized, of short duration, and not regularly repeated in any one location. The conservation measures would provide long term benefit to birds and mammals.	Potential impacts resulting from water supply operations and related activities are the same as those described for the Proposed Action Alternative. Implementation of the terrestrial wildlife conservation measures is not expected to change habitat conditions.
Amphibians and Reptiles	The No-action Alternative is expected to result in minimal changes to amphibian and reptile habitat conditions. However, there would be less certainty of protection than under the Proposed Action.	Potential impacts to the amphibian and reptile species resulting from water supply operations and related activities would be the same as those described for the No-action Alternative. The implementation of conservation measures could cause short term disturbance, but would also provide long term benefit to amphibian and reptiles. Improvements on riparian easements would improve habitat for frogs, and placement of salmon carcasses would increase invertebrate prey abundance. Implementation of the terrestrial wildlife	Potential impacts to the amphibian and reptile species resulting from water supply operations and related activities would be the same as those described for the No-action Alternative. Providing fish passage would increase the number of fish in the reservoirs, in the Bull Run River above the dams, and in the tributary streams. Additional predation would occur to Cope's giant and Cascade torrent salamanders and to coastal tailed frogs; however, these amphibian species evolved in the presence of the native fish and are adapted to avoid excessive predation

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
		conservation measures would have no impact on amphibian and reptile species.	pressure. Implementation of the terrestrial wildlife conservation measures would have no impact on amphibian and reptile species.
Hydrology	The City would provide flows from June 15 to September 30 ranging from 20 to 40 cfs depending on weather conditions (average 35 cfs). A minimum flow of 30 or 70 cfs would be provided from October 1 through October 31 depending on the type of flow year (normal versus critical). Temperature management practices under the No-action Alternative involve two infrastructure changes: modifying the Dam 2 intake towers for selective withdrawal, and modifying the Dam 2 stilling pool and its rock weir. These two changes would allow more effective use of the cold water stored in the reservoirs. As a result, there could be an increase in the amount of cold water available for distribution in the water supply system.	Base, peak, monthly and seasonal flows are expected to be higher with the Proposed Action than with the No Action Alternative because the No-action Alternative has minimum flow levels in all seasons, whereas the Proposed Action has minimums only from mid June to mid October. Temperature management practices are the same as under the No-action Alternative. Conservation measures, such as fish passage improvement projects and placement of large wood, log jams, and spawning gravel, would result in minor localized hydrologic changes compared to the No-action Alternative. Implementation of the terrestrial wildlife conservation measures would have no effect on hydrology. Acquisition of water rights in Cedar Creek (Measure F-5) would result in a slight increase in summer base flows in Cedar Creek.	The fish passage facilities are anticipated to have a similar effect on hydrology as the Proposed Action. The potential impacts to hydrology and water supply would be the same as those described for the Proposed Action. Temperature management practices are the same as under the No-action Alternative. Implementation of the terrestrial wildlife conservation measures would have no effect on hydrology. This alternative has passage to the upper Bull Run. (The Proposed Action has passage into Walker, Alder, and Cedar Creeks).

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
Water Quality	After the temperature management infrastructure modifications are in place, the City would manage flow to meet Oregon state water quality standards, as established by ODEQ's Sandy River Basin TMDL. Construction of the infrastructure modifications would be subject to compliance with existing laws and regulations, including applicable regulations from the Department of State Lands (DSL), which require a permit for the removal or fill of materials in state waterways. Construction activities are not anticipated to affect turbidity. Operation of the Bull Run water supply to meet water temperature conditions would slightly raise the average temperature of water after it has been diverted into the water system by approximately 1.8°F (1°C) during late August and September. However, the City's operations and treatment regime will address this increase sufficiently to allow the City to continue to meet all Federal and	Similar to the No-action Alternative, the City would manage flow to meet Oregon state water quality standards. Implementation of the conservation measures would require limited construction activities, such as placement of spawning gravel and large wood. These construction activities could result in increased erosion and runoff from construction areas. All activities would be subject to compliance with existing laws and regulations, including applicable state regulations, and are not anticipated to affect turbidity. Effects on drinking water quality under the Proposed Action would be the same as for the No-action Alternative.	Similar to the No-action Alternative, the City would manage flow to meet Oregon state water quality standards. Construction activities associated with the fish passage facilities could result in increased erosion and runoff from construction areas. All activities would be subject to compliance with existing laws and regulations, including applicable DSL regulations, and are not anticipated to affect turbidity. Fish passage past the Bull Run dams would enable fish access to spawning habitat in the upper Bull Run Watershed. Salmon die after spawning and their carcasses (and the associated nutrients) would remain in the watershed. The Ecosystem Diagnosis and Treatment model results predict low to moderate production potentials for accessible Bull Run stream reaches, even when a passage efficiency of 100 percent is assumed. The potential increase in fish carcasses is considered low (approximately 200 fish per mi.) and would not present a downstream water quality concern. Effects on drinking water quality under the Fish Passage Alternative would be the same as for the No-action Alternative.

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
	state drinking water quality regulations.		
Fish - Flow/Habitat Conditions	Available instream habitat in the lower Bull Run River would be less than existing conditions.	Available instream habitat in the lower Bull Run River would be greater than under the No-action Alternative.	Same as the Proposed Action.
- Temperature	Temperature conditions in the lower Bull Run River would improve relative to existing conditions, and would meet water quality standards with completion of the multi-level intake.	Same as the No-action Alternative.	Same as the No-action Alternative.
- Other Effects in the Lower Bull Run River	Riparian function, amount of large wood, and quantity of spawning gravel would be the same as existing conditions.	Riparian function, amount of large wood, and quantity of spawning gravel would be greater than under the No-action Alternative.	Same as the Proposed Action.
- Effects in the Sandy River Basin	Habitat conditions elsewhere in the Sandy River Basin would be the same as existing conditions.	Habitat conditions elsewhere in the Sandy River Basin would be greater than under the No-action Alternative because of measures such as riparian habitat acquisition and enhancement; placement of large wood, log jams, and spawning gravel; fish passage improvements on Alder and Cedar Creeks; and use of the Habitat Fund.	Same as the No-action Alternative.
- Viable Salmon Population Parameters (Abundance)	Viable salmon population parameters for fish populations would be approximately the same as existing conditions. Compared to current conditions, fall Chinook,	Viable salmon population parameters for fish populations would be greater than under the No-action Alternative. Compared to the No-action Alternative, fall Chinook, spring Chinook, winter steel-	Viable salmon population parameters for fish populations would be greater than under the No-action Alternative. Compared to the No-action Alternative, fall Chinook, spring Chinook, winter steel-

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
	spring Chinook, winter steelhead, and coho salmon adult abundance numbers would increase by approximately 75, 143, 20, and 31, respectively.	head, and coho salmon adult abundance numbers would increase by approximately 573, 743, 353, and 539, respectively.	head, and coho salmon adult abundance numbers would increase by approximately 174, 358, 647, and 36, respectively.
Socioeconomics and Environmental Justice	Total capital and O&M costs of the No-action Alternative are projected to be $34.5 million over the 50-year study period. Potentially, water rates could decline since the City would not continue several of its current actions. No environmental justice impacts would occur – minority and low income populations would not be disproportionately affected.	Total capital and O&M costs of the Proposed Action are projected to be $87.4 million over the 50-year study period. No environmental justice impacts would occur – minority and low income populations would not be disproportionately affected.	Total capital and O&M costs of the Fish Passage Alternative are projected to be $147.8 million over the 50-year study period. No environmental justice impacts would occur – minority and low income populations would not be disproportionately affected.
Cultural Resources	The No-action Alternative also includes modifications to the Dam 2 intake towers for selective withdrawal. Construction of these modifications and all operations and maintenance activities would comply with all applicable regulations associated with cultural resources.	Implementation of conservation measures under the Proposed Action could result in limited ground disturbance due to grading small access roads for spawning gravel and large wood placement, restoring riparian habitat, and earth-moving in the Sandy River Delta. The extent of required disturbance is not clearly defined at this time (activities would occur throughout years 1 to 15 of the permit term), but the City intends to avoid ground-disturbing activities to the maximum extent practicable.	This alternative would require the construction of four fish passage facilities at Bull Run Dams 1 and 2, both potentially eligible for listing on the National Register of Historic Places. Because of the potential eligibility for listing of Dams 1 and 2, construction of the fish passage facilities could result in an adverse effect. Similar to the Proposed Action, specific measures and protocols for the protection of cultural resources would be developed and described in a Cultural Resources Management Plan to

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
		To ensure that National Historic Preservation Act requirements are met, specific measures and protocols for the protection of cultural resources would be developed and described in a Cultural Resources Management Plan to be reviewed by the State Historic Preservation Office (SHPO) during the Section 106 consultation process.	be reviewed by SHPO during the Section 106 consultation process.
Air Quality	The No-action Alternative is expected to result in no changes to air quality conditions.	Construction activities associated with some of the conservation measures under the Proposed Action would result in increased emissions of criteria pollutants such as carbon monoxide and nitrogen oxides from vehicle and equipment exhaust, and fugitive dust (PM_{10}) from ground-disturbing activities. In particular, these impacts would occur as a result of implementing the habitat restoration measures. The increase in emissions would be temporary. Five conservation measures would occur in the carbon monoxide maintenance area near the Sandy River Delta. Carbon monoxide emissions would occur from vehicles traveling to and from construction areas and from operation of fuel-burning construction equipment. However, because of the short duration and relatively few numbers of these activities,	Construction activities for the fish passage facilities would result in increased emissions of criteria pollutants such as carbon monoxide and nitrogen oxides from vehicle and equipment exhaust, and fugitive dust (PM_{10}) from ground-disturbing activities. The increase in emissions would be temporary, and would not occur in an area that is in attainment of air quality standards.

Table ES-3 Summary of potential impacts for each alternative, continued

Category	No-action	Proposed Action	Fish Passage
		annual carbon monoxide emissions would not exceed applicable thresholds.	
Recreation	Under the No-action Alternative, access to recreation sites and angling regulations are expected to remain the same as current conditions. Wild fish abundance is expected to remain approximately the same (slight increase) as a result of temperature management actions. Sport fishing opportunities would remain similar to current conditions. Based on the flow regime of the No-action Alternative, no impact is expected to the quality of the rafting or in boating safety.	Under the Proposed Action, access to recreation sites and angling regulations are expected to remain the same as under the No-action Alternative. Additional increases in fish production and sport fishing opportunities are expected over the No-action Alternative as a result of the habitat conservation measures. Flow-related impacts to rafting would be similar to those described under the No-action Alternative. Flow would be higher in some time periods compared to the No Action Alternative, which could be a benefit to boaters. The Proposed Action includes the placement of large wood in several locations in the Lower Sandy River Watershed. This could present a hazard to recreational boaters. Before finalizing the location of these projects, the City would consider potential conflicts with safe boating practices and would consult with the boating community to avoid or minimize adverse effects.	Under Alternative 3, access to recreation sites and angling regulations are expected to remain the same as under the No-action Alternative. Additional increases in fish production and sport fishing opportunities are expected compared to the No-action Alternative because of the additional production from upstream areas. Flow-related impacts to rafting and boating safety would be similar to those described under the No-action Alternative.